

CLAIMS

What is claimed is:

- 5 1. A fuel delivery system for a vehicle having an engine, comprising:
 - a pump being configured to provide fuel to the engine;
 - a fluid pathway being in fluid communication with an outlet port of said pump at one end;
- 10 a regulator being disposed in said fluid pathway, said regulator regulating pressure of the fuel when said pump is pumping fuel into said fluid pathway; and
 - a combination valve being disposed in said fluid pathway, said regulator being located between said combination valve and said outlet port of
- 15 15 said pump, wherein said combination valve provides a check valve configured to allow fuel flow in a first direction and a system pressure relief valve configured to allow fuel flow in a second direction, said first direction being opposite to said second direction and said first direction being the same direction fuel is pumped in said fluid pathway by said pump.
- 20 2. The fuel delivery system as in claim 1, wherein said combination valve comprises a valve housing configured to be secured to said fluid pathway and defining an inner opening for receiving said system pressure relief valve therein, said system pressure relief valve defining an inner opening for receiving said check valve therein.
- 25 3. The fuel delivery system as in claim 1, wherein said valve housing is formed out of brass.

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4. The fuel delivery system as in claim 1, wherein said system pressure relief valve comprises a body portion configured to be axially received for movement within said inner opening of said valve housing, said body portion being configured to engage a biasing member disposed between said inner opening of said valve housing and said body portion of said system pressure relief valve, wherein said biasing member determines the amount of pressure required to move said body portion, which opens said system pressure relief valve.

5. The fuel delivery system as in claim 4, wherein said pressure relief valve is a one-way valve.

10 5. The fuel delivery system as in claim 4, wherein said check valve comprises a body portion configured to be axially received for movement within said inner opening of said system pressure relief valve, said check valve body portion being configured to engage a biasing member disposed between said inner opening of said system pressure relief valve and said body portion of said check valve, wherein said biasing member determines the amount of pressure required to move said body portion, which opens said check valve.

15 6. The fuel delivery system as in claim 4, wherein said check valve comprises a body portion configured to be axially received for movement within said inner opening of said system pressure relief valve, said check valve body portion being configured to engage a biasing member disposed between said inner opening of said system pressure relief valve and said body portion of said check valve, wherein said biasing member determines the amount of pressure required to move said body portion, which opens said check valve.

20 7. The fuel delivery system as in claim 6, wherein said check valve is a valve which allows flow therethrough under a first set of conditions or pressures, while preventing back flow and said pressure relief valve is a valve which allows flow therethrough under another set of conditions or pressures, while preventing back flow.

25 8. The fuel delivery system as in claim 7, wherein said regulator is configured to only regulate fuel pressure when fuel is being pumped by said pump.

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9. The fuel delivery system as in claim 8, wherein said system pressure relief valve opens at a pressure higher than a relief setting of said regulator.

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10. The fuel delivery system as in claim 8, wherein said regulator has a relief setting of approximately 400 kPa and said system pressure relief valve opens at approximately 600 kPa and said check valve opens at approximately 20 kPa.

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11. The fuel delivery system as in claim 1, wherein said regulator has a relief setting of approximately 400 kPa and said system pressure relief valve opens at approximately 600 kPa and said check valve opens at approximately 20 kPa.

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12. The fuel delivery system as in claim 1, wherein said regulator is configured to only regulate fuel pressure when fuel is being pumped by said pump.

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13. A method for maintaining fuel pressure in a fuel delivery system of a vehicle having an engine during engine shut down periods, comprising:
disposing a fuel delivery system within a fuel reservoir of a vehicle, the fuel delivery system, comprising: a pump being configured to provide fuel to the engine; a fluid pathway being in fluid communication with an outlet port of said pump at one end; a regulator being disposed in said fluid pathway, said regulator regulating pressure of the fuel when said pump is pumping fuel into said fluid pathway; and a combination valve being disposed in said fluid pathway, said regulator being located between said combination valve and said outlet port of said pump, wherein said combination valve

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provides a check valve configured to allow fuel flow in a first direction and a system pressure relief valve configured to allow fuel flow in a second direction, said first direction being opposite to said second direction and said first direction being the same direction fuel is pumped in said fluid pathway by said

5 pump;

wherein said system pressure relief valve is configured to open when fuel in said fluid pathway exceeds a predetermined value when the engine of the vehicle is not running.

10 14. The method as in claim 13, wherein said predetermined value is greater than the pressure setting of said regulator.

15. The method as in claim 14, wherein said regulator is configured to only regulate fuel pressure when fuel is being pumped by said pump.

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16. The method in claim 15, wherein said regulator has a relief setting of approximately 400 kPa and said system pressure relief valve opens at approximately 600 kPa and said check valve opens at approximately 20 kPa.

20 17. A fuel delivery system for a vehicle having an engine, comprising:

a pump being configured to provide fuel to the engine;
a fluid pathway being in fluid communication with an outlet port of said pump at one end;

25 a regulator being disposed in said fluid pathway, said regulator regulating pressure of the fuel when said pump is pumping fuel into said fluid pathway; and

a combination valve being disposed in said fluid pathway, said regulator being located between said combination valve and said outlet port of

said pump, wherein said combination valve provides a check valve configured to allow fuel flow in a first direction, a system pressure relief valve configured to allow fuel flow in a second direction, and a pump pressure relief valve configured to allow fuel flow in said first direction, said first direction being

5 opposite to said second direction and said first direction being the same direction fuel is pumped in said fluid pathway by said pump, wherein said pump pressure relief valve is configured to open at a pressure value higher than the pressure required to open said check valve.

10 18. The fuel delivery system as in claim 17, wherein said combination valve comprises a valve housing configured to be secured to said fluid pathway and defining an inner opening for receiving said pump pressure relief valve therein, said pump pressure relief valve defining an inner opening for receiving said system pressure relief valve therein and said system pressure relief valve defining an opening for receiving said check valve therein.

15 19. The fuel delivery system as in claim 18, wherein said pump pressure relief valve comprises a body portion configured to be axially received for movement within said inner opening of said valve housing, said body portion being configured to engage a biasing member disposed between said inner opening of said valve housing and said body portion of said pump pressure relief valve, wherein said biasing member determines the amount of pressure required to move said body portion, which opens said pump pressure relief valve, and said system pressure relief valve comprises a body portion configured 20 to be axially received for movement within said inner opening of said pump pressure relief valve, said body portion being configured to engage a biasing member disposed between said inner opening of pump pressure relief valve and body portion of said system pressure relief valve, wherein said biasing member determines the amount of pressure required to move said body portion, which

opens said system pressure relief valve and said check valve comprises a body portion configured to be axially received for movement within said opening of said system pressure relief valve, said body portion being configured to engage a biasing member disposed between said opening of said system pressure relief

5 valve and said body portion of said check valve, wherein said biasing member determines the amount of pressure required to move said body portion, which opens said check valve.

20. The fuel delivery system as in claim 19, wherein said check valve
10 is a valve which allows flow therethrough under a first set of conditions or pressures, while preventing back flow and said pressure relief valve is a valve which allows flow therethrough under another set of conditions or pressures, while preventing back flow.

15 21. The fuel delivery system as in claim 19, wherein said regulator is configured to only regulate fuel pressure when fuel is being pumped by said pump.

22. The fuel delivery system as in claim 20, wherein said regulator
20 has a relief setting of approximately 400 kPa and said pressure relief valve opens at approximately 600 kPa and said check valve opens at approximately 20 kPa.

23. The fuel delivery system as in claim 22, wherein said pump
25 pressure relief valve opens at approximately 700 kPa.

24. A fuel delivery system for a vehicle having an engine, comprising:

a pump being configured to provide fuel to the engine, said pump having an outlet port;

a combination valve being disposed proximate to said outlet port and being in fluid communication with said pump, wherein said combination

5 valve provides a check valve configured to allow fuel flow in a first direction, a pump pressure relief valve configured to allow fuel flow in said first direction, said first direction being the direction fuel is pumped to the engine, wherein said pump pressure relief valve is configured to open at a pressure value higher than the pressure required to open said check valve.

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25. The fuel delivery system as in claim 24, wherein said combination valve comprises a valve housing configured to be secured to said outlet port and defining an inner opening for receiving said pump pressure relief valve therein, said pump pressure relief valve defining an inner opening for

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receiving said check valve therein.

26. The fuel delivery system as in claim 25, wherein said pump pressure relief valve comprises a body portion configured to be axially received for movement within said inner opening of said valve housing, said body

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portion being configured to engage a biasing member disposed between said inner opening of said valve housing and said body portion, wherein said biasing member determines the amount of pressure required to move said body portion, which opens said pump pressure relief valve, and said check valve comprises a body portion configured to be axially received for movement within said inner

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opening of said pump pressure relief valve, said body portion of said check valve being configured to engage a biasing member disposed between said inner opening of said pump pressure relief valve and said body portion of said check valve, wherein said biasing member determines the amount of pressure required to move said body portion, which opens said check valve.

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27. The fuel delivery system as in claim 1, wherein said pump, said fluid pathway, said regulator and said combination valve are received within a housing configured to provide fuel to be in fluid communication with an inlet port of said pump.
28. The fuel delivery system as in claim 1, wherein said outlet port of said pump contains no fluid restricting valve.